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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,640	08/26/2003	Paul W. Buckley	135946-1	3895

23413 7590 11/18/2004

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EXAMINER
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ZIMMER, MARC S

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/648,640	BUCKLEY ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Marc S. Zimmer	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-112 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 108-112 is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) 6-19, 24, 29, 30, 33, 36, 37, 41, 44-49, 52, 65, 70, 77, 78, 81, 84, 85, 87-89, 93, 95 and 96 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                                    |

Continuation of Disposition of Claims: Claims rejected are 1-4, 5, 10, 13, 15 20-23, 25, 26-28, 31-32, 34, 35, 38-40, 42, 43, 45, 50, 51, 53-57, 59-64, 66-69, 71-76, 79-80, 82, 83, 86, 90-92, 94, 95, 97-103 and 104-107.

***Information Disclosure Statement***

Applicant has advised that Japanese document no. 63-256427 was crossed out on the PTO-1449 form only because, should this application evolve into a patent, the Examiner wishes the cover sheet to reflect that this document was cited by the Examiner as these documents receive special designation with an asterisk.

***Claim Analysis***

Applicant claims a polymer blend meeting a specified purity standard described as "substantially free of visible particulate impurities". This phrase is delineated in paragraph 18 of the Specification as meaning that a ten gram sample of the polymer blend dissolved in 50 ml of chloroform exhibits fewer than 5 specks visible to the naked eye when viewed in a light box. According to that same paragraph, the naked eye is able to see particles greater than 40 micrometers in diameter.

As a means of achieving this level purity of purity, Applicant discloses a litany of different measures that can be taken ranging anywhere from using the purest forms of the starting materials (monomers) available to filtering the mixture either in the melt or in solution after the polymer materials have been formed and combined. Ultimately, Applicant has not expressly identified those measures which will alone, or in combination, provide a blend that is substantially free of visible particulate impurities. However, it seems apparent to the Examiner that any anticipatory process would have to include at least (i) a means of removing volatile impurities by such techniques as distillation, stripping *in vacuo*, etc and (ii) a means for removing non-volatile impurities

by such techniques as crystallization/precipitation in a solvent that solvates the impurity but not the polymer or filtration of a polymer mixture either in the melt or in solution.

***Claim Objections***

Claim 25 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It seems that continuous and batch filtration together would encompass methods of filtration hence this claim fails to further limit claim 22.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 102 and 103 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Antecedent basis would appear to be lacking in claim 63 as there are no process steps that explicitly contemplate the utilization of a solvent.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 20-23, 25-26, 28, 32, 34-35, 38-40, 42-43, 45, 50-51, 53-56, and 60-62 are rejected under 35 U.S.C. 102(b) as being anticipated by Moritani et al., JP 63-256427. They describe a molded product derived from a resin mixture wherein the product has fewer than 10,000 "units/gm" of particles being of particle size greater than 1  $\mu\text{m}$  (page 15 of the translated document). Notably, they do not disclose the purity of the resin mixture in the same terms as does Applicant but it is the position of the Examiner that the product, and hence the resin mixture from which the product is manufactured, inherently satisfies the property limitation set forth in claim 1 insofar as provisions are made for removal of both volatile and non-volatile impurities.

All pages numbers recited herein to set out the locations of the relevant teachings are those of the translated document.

The polymer resin mixture of interest to Moritani et al. is that of polyphenylene ether and a polymer derived from aromatic vinyl monomer (page 16) wherein the latter contains more than 50% (page 17) of said aromatic monomer (other potential comonomers are outlined at the top of page 18). Polyphenylene ether adhering to the structure displayed at the bottom of page 20 and having a limiting/intrinsic viscosity (page 22) of preferably 0.3-0.7 when measured in chloroform at 25° C is prepared by polymerizing phenolic compounds in an oxidative atmosphere in the presence of catalyst and solvent using known synthetic methodology including that described in any of the Japanese documents mentioned in the second paragraph of page 21. Aromatic vinyl polymers based on styrene are desirable (bottom of page 17) and, inasmuch as the vinyl polymer is prepared using a peroxide initiator (page 20), the resulting

polystyrene will be atactic as these initiators have no stereo-directing capabilities.

According to the paragraph bridging pages 22 and 23, the polymer blend should contain between 35 and 70 wt.% of the aromatic vinyl polymer and 30-70 wt.% of polyphenylene ether consistent with the requirements of claims 55 and 56.

It is stated on page 24 that the formed polymers may be blended by solution mixing or "fusion" mixing which ostensibly is the same as mixing in the melt given that fusion mixing is carried out in a screw extruder (page 26). The extruder is said to be equipped with a sintered metal filter at the end that serves to remove particles having a diameter greater than 1  $\mu\text{m}$  (paragraph bridging pages 25 and 26 and lines 10-12 on page 26). Upon exiting the extruder, the filtered blend is pelletized for subsequent processing in an injection molding apparatus. Solution blending is carried out in one of the solvents listed on page 27, lines 6-9. Insoluble particulates may be removed from the polymer blend by filtration of the solution using any of the filtration setups disclosed on page 28. Thereafter, a homogeneous solid mixture of the polymer is recovered by precipitating the polymer materials in a large volume of a poor solvent and/or evaporation of the solvent followed by pelletization (page 27).

Concerning claims 32 and 35, Example 1, indicates that the polymer materials were, "mixed *and* blended *and* were kneaded and pelletized using a biaxial screw extruder." Given the sentence construction, it appears that the blending/mixing are performed in an apparatus other than the extruder prior to kneading and pelletizing. The pelletized polymer mixtures are subsequently extrusion/injection molded into optical disks designed for data storage.

As for claim 39, given that the objective is to remove as much as is possible particulates having a particle diameter greater than 1  $\mu\text{m}$ , the filtering devices described in the reference will inherently satisfy this limitation.

As for claim 58, the abstracts of the references particularly cited as being directed to acceptable polyarylene oxide syntheses disclose the utilization of aromatic solvents including xylene.



***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27, 31, 63-64, 66-69, 71-76, 79-80, 82-83, 86, 90-92, 94-95, 97-100, 102, and 104-107 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moritani et al., JP 63-256427. Moritani et al. explicitly teach a method(s) of preparing a purified blend of polyarylene oxide and poly(alkenyl aromatic), the pelletization of the purified blend and the making of molded products from the pelletized blend. Further, they advocate carrying out molding operations that follow isolation of the resin materials from foreign particulates in a clean atmosphere (bottom of page 33). There is, on the other hand, no express provision for packaging and storing the materials in a clean environment. This manipulation is, nonetheless, obvious in view of Moritani's suggestion to perform molding steps in a clean room. That is, the skilled artisan would appreciate that, given (i) the measures taken to remove impurities before using the resins in a molding process and (ii) the suggestion in the reference that molding processes should be carried out in a clean atmosphere, it would be illogical to perform steps in between the purification steps and the molding steps, i.e. packaging and storing, in anything but a clean environment due to the potential exposure of the resin mixture to impurities that would undermine the measures taken before and after. Claims 64, 66-69, 71-76, 80, 82-83, 86, 90-92, 94-95, 97-100, and 104 to 107 limit claim

63 in much the same way that 2-4, 20-23, 25-26, 28, 32, 34, 38-40, 42-43, 45, 50-51, 53-56, and 60-62 limit claim 1 and are, therefore, rejected using the same rationale.

As for claim 27, it will be appreciated that the filtration apparatus must be sufficiently heated so as to prevent solidification of the resin during filtration. At the same time, it will also be appreciated that the system should not exceed those temperatures where decomposition of one or both of the polymer materials begins to occur.

As for claims 31 and 79, Moritani is silent concerning residence time. However, it is the position of the Examiner that residence time is one variable that will be optimized by one of ordinary skill as a matter of routine experimentation, to ascertain the best compromise between process efficiency and homogeneity of the mixed product. That is, the skilled artisan will determine the smallest residence time required that still provides a thoroughly mixed and, where volatiles are removed in the extruder, dry mixture. "[W]here the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (ie. does not require undue experimentation)." *In re Aller*, 105 USPQ 233. "Discovering an optimum value of a result effective variable involves only routine skill in the art." *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 4-5, 10, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moritani et al., JP 63-256427 in view of Bennett et al., U.S. patent # 3,838,102.. The primary reference does not delve deeply into the preparation/isolation of the individual polymer materials to the extent that they are already well known and its

focus is the preparation of polymer blends meeting certain purity standards. On the other hand, Bennett advocates catalyst removal, a manipulation not expressly contemplated by Moritani, because its continued presence leads to polymer degradation and discoloration (column 1, lines 48-52) that provide another source of the particulate impurities. Catalyst removal is facilitated by adding chelating agents to the polymer by, for instance, introducing it as a solution in water, liquid-liquid extracting the catalyst from the polymer, allowing separation of the biphasic system into layers and removing the aqueous phase (column 4, lines 3-9). Additional water washings are advocated in the following paragraph. Polyphenylene oxide may then be isolated from the solvent by conventional approaches such as precipitation in a large volume of a poor solvent such as a lower alcohol (column 4, lines 59-64) and, of course, drying.

Claims 57 and 101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moritani et al., JP 63-256427 in view of Feureherd et al., U.S. Patent # 5,130,356. Moritani does not expressly contemplate incorporating materials other than the polymers as its concentration, again, is on the purification of the polymer mixture. However, Feuerhard teaches an identical composition for a similar purpose and emphasizes that the appearance of undesirable specks and gel particles during molding processes is still problematic (column 2, lines 59-63) and, therefore suggests adding a class of quinones/hydroquinones that appear to not only hinder their formation but also serves as a UV stabilizer (column 22, lines 1-4). In addition to these materials, it is further contemplated that antioxidants, lubricants, and dyes are conventional adjuvants.

"It is prima facie obvious to add a known ingredient to a known composition for its known function." *In re Lindner* 173 USPQ 356; *In re Dial et al* 140 USPQ 244.

Claims 59 and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moritani et al., JP 63-256427 in view of Cooper et al., U.S. Patent # 3,733,299. Moritani does not expressly teach the conditions under which the polyarylene oxide component is formed. Instead, the disclosure refers to several Japanese documents that teach prior art methods. Although it is clear from the abstract of at least one of these documents that inert aromatic solvents are employed, translations of the documents themselves were not immediately available to ascertain the suitability of toluene and o-dichlorobenzene. Nonetheless, where a reference fails to disclose one or more aspects of their invention because they are widely taught in the prior art, a person of ordinary skill would simply turn to the related art to discover what is conventional for that aspect. Cooper illustrates that the general synthetic methodology has been known for decades and, further, identifies both toluene and o-dichlorobenzene as appropriate solvents in column 4, lines 58-60.

#### ***Allowable Subject Matter***

Claims 6-19, 24, 29-30, 33, 36-37, 41, 44, 45-49, 52, 65, 70, 77-78, 81, 84-85, 87-89, 93, 95-96 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 108-112 are allowed. Moritani discloses steps to purify the polymer materials after they are combined so it is not immediately

obvious as to why prior filtration steps might be needed. Some of the specific permutations of the extrude set-up are not obvious in view of the prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc S. Zimmer whose telephone number is 571-272-1096. The examiner can normally be reached on Monday-Friday 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

November 16, 2004

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